

### 1. Electrospinning Machine

Sl. No.	Specification	Range / Value
1	Application	Preparation of fibers from polymers solution; fabrication of nanofiber mats, fabrics, nanofilters and nanoscaffolds; should be capable of direct coating on substrates, like glass, fabric, etc.
2	Spinning Arrangement	Horizontal and vertical spinning
3	Power supply control unit	· Microprocessor based controller system
		· Voltage supply: 0- 40 KV or higher
		· Current range: from zero to more than 350 $\mu$ A or better
		· Digital display for both current and voltage monitoring
		· Continuously adjustable voltage output from zero to maximum output
		· When the current surpasses 20% of the maximum output current, the machine shuts down due to overload.
		· Proper protection if sparking occurs between two electrodes
4	Collector Specifications	· Three types:
		• Stationary collector
		• Drum collector
		• Disc Collector
		· Adjustable speed of rotating drum from 100 to 500 rpm
5	Spinneret	· Should produce co-axial, hollow micro/nanofibers and Core/sheath fibers High throughput fibre fabrication
		· No of syringe pump – 2 No

6	Independently programmable controlled Syringe pump	· Each syringe pump
		· Flow rate ~ 0.1 µl/min - 3 (or above) ml/min with extremely precise operations
		· Microprocessor based operation for precise flow control
7	X, Y and Z- axis stage	Programmed on the operation unit through PC/mounted panel control
8	Spinning Distance	· Distance Between Nozzle and Collector Distance 30 mm-330 mm or more
		· Adjustable
9	Spinning chamber	· Humidity display meter
		· Temperature control (Room Temp. to 45 ° C (or better) with accuracy of ±0.1 °C)
		· Exhaust fan
		· Transparent window to view real time spinning operation
		· Inert gas purging facility
		· Lighting (Normal & UV)
10	Nozzles	Metallic needles; Single nozzle, multi nozzles, core-shell nozzle and co-axial nozzle; with minimum 4 different nozzle diameter. IDs to be specified by the bidder
11	Fiber Diameter	Should be capable of producing fibers of diameters 20 nm to 1 µm (inclusive of both)
		· Syringe with needles
		· Chemical resistant tubing with connector

12	Accessories to be quoted and supplied along with machine / equipments:	· Insulation floor mat and Electrical safety gloves
		· Standard spinning samples
		· UV Curing Lamp
		· Dehumidifier
		· Additional 10 set of needles at each type
13	Warranty	2 years
14	Safety system	· Safety door lock system to avoid electrical shock and an exhausting system to evacuate evaporated solvents and flying nanofibers.
		· Over Current Protection
		· Static electricity removal device; protection from overload and sparking between electrodes; solvent-resistant PTFE tubing with solvent-resistant connector should be provided

## 2. BENCHTOP NMR

Sl. No.	Specification	Range / Value
1	Type	It should be benchtop non-cryo type Nuclear Magnetic Resonance Spectrometer
2	Magnet Type	Permanent, Cryogen-Free, should provide frequency to entire sample without tube movement
3	Operating frequency	80 MHz ( <sup>1</sup> H) or higher
4	Probe	It should have single probe for <sup>1</sup> H, <sup>13</sup> C and <sup>19</sup> F, no probe changes desired.
5	<sup>1</sup> H 50% Line width	0.5 Hz or better (Instrument software Shim test report along with 10% H <sub>2</sub> O in D <sub>2</sub> O or shim standard sample peak with resolution at <sup>1</sup> H 50% Line width should be submitted)

6	$^1\text{H}$ 0.55% Line width	12 Hz or better (Instrument software Shim test report along with 10% $\text{H}_2\text{O}$ in $\text{D}_2\text{O}$ or shim standard sample peak with resolution at $^1\text{H}$ 0.55% Line width should be submitted)
7	$^1\text{H}$ 0.11% Line width	20 Hz or better (Instrument software Shim test report along with 10% $\text{H}_2\text{O}$ in $\text{D}_2\text{O}$ or shim standard sample peak with resolution at $^1\text{H}$ 0.11% Line width should be submitted)
8	Sensitivity (Signal: Noise)	It should offer 100 :1 or better for 1% Ethyl Benzene, Measured in a single scan on the quartet of the $\text{CH}_2$ group. (Spectra of standard sample with desired sensitivity should be submitted as a proof)
9	Anomer Study option	Should have carbon 2D variant with NOE, APT for anomer configurations
10	Lock Type	External Hardware Lock should be Independent of the sample and No Deuterated solvent should be required
11	Shimming	Shimming should be fully automated. Shimming for each sample should not be required
12	Experimental Protocols	It should perform following protocols with ease for all nuclei H, F and Carbon 1- D (H, F, and C), 1-D Paramagnetic, 2-D COSY (Correlation Spectroscopy), 2-D TCOSY (Total Correlation Spectroscopy), 2-D JRES (Homonuclear J-Resolved Spectroscopy), 2D F – COSY (Correlation Spectroscopy), 2D F – JRES (J-Resolved Spectroscopy), 2D FH – COSY (Correlation Spectroscopy), Relaxation T1 and T2, Proton Pulse-Decoupled, DEPT (Distortion less Enhancement bipolarization Transfer), APT (Attached Proton Test), HETCOR (Heteronuclear Correlation Spectroscopy), HMBC (Heteronuclear Multiple Bond Correlation), HMQC (Heteronuclear Multiple-Quantum Correlation), HSQC (heteronuclear single quantum correlation) HSQC-ME (multiplicity-edited HSQC)
13	Operating temperature	Room Temperature
		An appropriate software with permanent license should be offered along with the system

14	Software and Computer	i7 processor 10 <sup>th</sup> generation, 16 GB RAM, DVD - RW, 500 GB SSD, Windows 11 with lifetime license, 27" LCD display with better specifications along with a suitable laser printer
15	Accessories to be quoted and supplied along with machine / equipment's:	1. Online reaction monitoring Kit- 01 No. with temperature controlled transfer line (Operating Temperature range: 25 oC to 60 oC)
		2. NMR tube- 100 nos.
		3. Maintenance kit-01 no.
16	UPS	02 kVA with 30 minutes back up
17	Warranty	02 years warranty should be provided with continued software upgradation as and when released
18	Inspection and acceptance	The duly authorized representative(s)/scientists of the CIPET shall have the right, before payment, to inspect the Goods. Upon delivery of the Goods, the CIPET shall inspect the goods as soon as possible and complete the Goods Receiving Document. Should any Goods fail to conform to the technical specifications, codes and standards under the Contract, the CIPET may reject the Goods. The supplier shall, at no cost to the CIPET, replace the rejected Goods or, alternatively, rectify the non-conformity
19	Training	Onsite training (03 days) should be provided to the staff after installation by expert engineers. The Supplier shall provide all facilities for such training programme Complete set of manuals for the operation of equipment should be given
20	Scope of supply	Complete list of items quoted are to be provided
21	Installation & Commissioning	The Machine should come with all other essential accessories & spares required for installation, commissioning & operation

### 3. Melt Flow Rate Tester

Sl. No.	Specification	Range / Value
1	Scope	Determination of flow properties of polymer powders & granules
2	Purpose	For automatic Measurement of Flow behaviour of Polymeric materials as per ASTM & ISO methods
3	Standard	ISO 1133 and ASTM D1238, Method A, B & C, and other equivalent International standards
4	Temperature range	30 to 400 °C
5	Temperature display resolution:	+/- 0.1 °C
6	Temperature controller	Electrically heated with microprocessor based PID Digital Temperature Controller
7	Timer	Digital timer with a range of 999.9 sec or better, accuracy +/- 0.001 sec with buzzer indication facility
8	Display	On-board LCD Display with alphanumeric keypad for methods setting and visualization of results
9	Thermal stability:	+/- 0.2 °C from 30 to 400 °C with thermal fuse protection
10	Data acquisition	MVR with up to 10 data points acquisition for a single test (with encoder)
11	General requirement	Corrosion resistant pistons and barrel inert to the test materials confirming to ISO 1133 & ASTM D1238 with dimensional conformity traceable certificate
12	Die	Standard die as per ISO 1133/ASTM D1238 Diameter 2.095 mm, Length 8 mm, tungsten carbide; should be supplied with dimensional conformity certificate
13	Die and cylinder dimension	Confirming to ASTM D1238 & ISO 1133
14	Calibrated Go/No-Go Gauge	Go-Gauge shall not be <2.090 mm.
		No-go gauge shall not be >2.100 mm.

15	Barrel Cylinder	Hardened Nitride Steel
16	Motorized Lifting	Should be equipped with high accuracy encoder and motorized lifting device to allow precise and exact positioning of the lifting device for the masses
17	Cutting device	Automatic cutting device
18	Calibration certificates	A calibration certificate from NABL accredited lab with traceability to NIST/International standards for load, timer, temperature controller & mass measurement to be provided
19	Special Features	High Precision digital encoder for automatic measurement of MVR
		Auto weight loader and lifter for automatic and accurate test mass application
		Integrated load system for material compacting, purging and final expulsion with a controlled and programmable force
		High-temperature accuracy and stability
		On-board interface for method setting and visualization of results
		Fully automatic mass selector system to carry out tests with single weight or multiple weights in increasing, decreasing or free sequence
		Built in timer with buzzer alarm
		Temperature accuracy and stability according to standards on whole working range
		Quick release die slide
		Corrosion-resistant material for barrel, piston, and dies
20	Masses	0.325, 1.0, 1.2, 2.16, 3.8, 5, 10, 15, 21.6 kg
		CRM with NIST traceable certificate

21 Accessories

Windows-based software

A Personal Computer having latest configuration: i7 processor 10th generation, 16GB RAM, DVD - RW, 500 GBSSD, Windows 10 or higher with lifetime licence, Latest microsoft Office professional, 27"LCD display, Wifi enabled or with better specifications along with a suitable laser printer

Spare Standard Die/Nozzle and Piston

Fuses and Thermal Probe

UPS (5 KVA) for 1 hour or higher power backup (2 years warranty on UPS and 2 years warranty on batteries)

Hard copies of Operational & Service Manual- 01 set

The Machines should come with all other essential accessories & spares (as per ASTM & ISO standards) required for installation, commissioning & operation

Standard Tool Kit containing cleaning tool for barrel and die, compression tool, die removing tool, die plug, cut-off knife, laboratory funnel or spoon for sample loading into barrel, levelling device, die retaining plate, tilt mirror, cleaning patches & cleaning cream

Should be supplied with suitable external thermometers to calibrate the barrel temperature at 190 °C, 230 °C & 300 °C with traceable calibration certificate (188°C to 192°C with readability 0.1°C), (228°C to 232°C with readability 0.1°C) & (298°C to 302°C with readability 0.1°C)

01 No. of extra standard die set and guages as per standard

Safety gloves & goggles required for day to day activities during operation of Machine-01 set

Necessary Hoses & Nipples & pressure controller sytem required to connect the air line & Switches & adaptors for electrical connection-01 set



		The equipment should be supplied with all the essential accessories to meet the standard methods mentioned above. The Basic start-up kit including material for calibration shall be provided by the supplier
22	Software	<p>Software for set up of parameters, automatic control of operations like automatic weight lifter, storage of various test parameters &amp; measurement points &amp; Standard functions like auto calibration , calculation&amp; data collection</p> <p>PC control and advanced data analysis</p> <p>For Graphs and numerical data for the whole test, Basic statistical analysis of data</p> <p>Shear Rate, shear stress, and viscosity (flow curve from multi-weight tests), MVR, Intrinsic Viscosity (I.V.) estimated through correlation with MFR data/MVR Data</p> <p>Operating console with LCD display</p>
23	Standard Reference Materials	Standard Reference Materials of low MFI & with NIST traceable certificate as per ASTM 1238 requirements to be supplied
24	Warranty	Minimum 2 years warranty must be provided
25	Scope of supply	Complete list of items quoted are to be provided
26	Training	Training on operation & maintainance of the equipment should be provided onsite
27	Intallation & Commissioning	The Machine should come with all other essential accessories & spares (as per ASTM & ISO standards) required for installation, commissioning & operation.

#### 4. Computerized Universal Testing Machine - 100 kN

Sl. No.	Specification	Range / Value
1	Application	Testing of Materials and products for different mechanical properties as per the relevant standard Test Methods of ISO, ASTM and IS etc.
2	Maximum Capacity	100 kN

3	Crosshead Travel	Min. 1000 mm
4	Clearance between columns (horizontal Daylight)	550 mm (Minimum)
5	Provision for Measuring Range	Upto 100kN
6	Load cell Accuracy	Accuracy: +/- 0.5% or better of applied force, and (+/-) 0.5% or better of reading down to 0.5% or better of full scale. Range :0.2% to 100% for all the load cells (together from 200 N or better to 100kN maintaining +/-0.5% accuracy). Internal sampling rate: 1000 sample/sec or better with ASTM E83 & ISO 5893 and to an accuracy within 1 %.
7	Cross Head Speed	Min. 0.001 mm/min
8	Straining / Testing speed ( at no Load/Full load)	Should be 500 mm/min or better (Straining at variable speed)
9	Through Precision Load cells & coupling	<b>100kN with LC - 0.0125N or better and adapter for load cell attachment &amp; grip</b>
10	Standard Accessories	Frame Stiffness – 250kN/mm or better
		Crosshead Position Accuracy: 0.05% or better
10.1	<b>1) <u>TENSILE TEST FOR METAL PIPES SPECIMEN</u> :-</b>	
	Grip head arrangements for the tensile Specimen of metal pipes with throat area available with Shank length of different diameters :- (Tensile Test Method IS 1608 / ISO 6892)	up to 25 mm thickness of metal pipe
10.2	<b>2) <u>TENSILE TEST FOR ROUND SPECIMEN</u> :-</b>	
	Clamping Jaw for Round Specimen of Diameter & flat specimen	Up to & including 20mm for round specimen and up to & including 12 mm thickness for flat sample with 50 mm width.

10.3	3) <b><u>COMPRESSION TEST:</u></b>	
	Pair of compression plates of diameters	150 mm with Max. 100kN capacity.
11	<b>Flexural Test/Bend Test</b>	3 point Bend fixture with span continuously variable from 30mm to 300mm or more and roller diameter 4mm/10 mm and length of loading bars 50mm or more & complies with ASTM D 790.
12	Grips & Fixtures for Plastic/Rubber&Rope sample testing	<b>The machine should have versatile removable grips and fixtures so that it can be changed quickly to meet variable requirements in tension, compression, shear, flexure etc. and should be Pneumatic and Self-tightening wedge grip as per ASTM D 638, IS 4984:2016, IS 12235 (Part 13):2004 and ISO 4427:2019 etc.</b>
		Provision of special gripping for polymeric, film and rubbery materials, Rope Samples, Wide variety of grips and fixtures
		Provision for Pneumatic grip 25 x 50 mm up to 5 KN or higher capacity.
		Provision for LVDT compressometer and Deflectometer compatible for use with above compression platen and bend fixtures as per ASTM D 695. Provision for creep testing of DWC pipes with suitable LVDT device integrate with main testing software.
		<b>Heavy Duty Vice Grip for 20kN for woven sacks as per IS 14968, IS 14887 and HDPE Geo-membrane as per ASTM D 6392 .</b>
13		Printer & PC graphs enable study the behaviour of the material.
		Motor driven threaded columns for quick effortless adjustment of lower cross-head-to facilitate rapid fixing of test specimen.
		Digital display on hand held interface <b>and through PC</b>
		USB or any suitable port to transfer data to computer for analysis/storage evaluation etc.
		· Suitable encoder of minimum display resolution 0.001 mm or better. Data acquisition rate for displacement measurement should be 2.5 kHz or better.

14	Strain Unit	<ul style="list-style-type: none"> <li>· Tension, Compression, bending, transverse and shear test to be conducted between lower cross head and table</li> </ul>
		<ul style="list-style-type: none"> <li>· Provision for rapid change the position of lower cross head by operating screwed column for easy fixing of specimen.</li> </ul>
15	<b>Extensometer (Mechanical - Contact Type)</b>	
15.1	Measuring range	Long travel Extensometers up to 700mm or more to measure strain by means of knife edges which contact the sample till break. Gauge length of 10 mm, 15mm, 20mm, 25mm, 50mm should be provided. Supplied unit must meet ASTM E83 & ISO 5893 and to an accuracy within 1 %.
15.2	Least count	0.01 mm or better
15.3	Arm travel	Requirements: Should be left on specimen through failure, Lightweight to minimize any influence on the test, Low operating tracking force - Rugged construction to withstand rigors of operation, The strain should be used to control the machine in a closed loop feedback controlled mode
15.6	Data Acquisition & Software	Material testing Software with Metal & Plastic Module with methoded data base
		<ul style="list-style-type: none"> <li>· Real-time image, stress-strain curve, load deformation, load-time curve, load/strain, Young Modulus etc. shall be displayed by the software.</li> </ul>
		<ul style="list-style-type: none"> <li>· The upper and lower yield, maximum breaking and strain, breaking/elongation ratio of selecting point etc. required be supplied from graphic.</li> </ul>
		<ul style="list-style-type: none"> <li>· Software shall record and generate test report. The software shall have wide range of process. Test results can be displayed in Metric and System International (SI) system.</li> </ul>
		<ul style="list-style-type: none"> <li>· Automatic zeroing at the beginning of the test and auto return facility after specimen failure is required</li> </ul>

		<ul style="list-style-type: none"> <li>· All test results to be displayed on the screen. System should have option for automatic break detection</li> </ul>
		<ul style="list-style-type: none"> <li>· Software should compatible with extensometer</li> </ul>
		<ul style="list-style-type: none"> <li>· Data analysis, statistics, point tracing, superimposing graph for comparison should be available</li> </ul>
		User programmable method in software for cyclic loading and creep test should be provided.
<b>16</b>	Calibration	Calibration certificates shall be provided initially for the applicable parameters of UTM & Extensometer viz. load, displacement and strain etc. ensuring that the measurement results are traceable to International systems of units as per the Cl. No. 6.5 of ISO/IEC-17025-2017.
<b>17</b>	Installation, Commissioning & Performance guarantee	<ul style="list-style-type: none"> <li>· The Supplier shall be responsible for carrying out the Installation and Commissioning at customer site.</li> </ul>
		<ul style="list-style-type: none"> <li>· Shall provide warranty for the satisfactory performance of the system for a period of two years after satisfactory installation and commissioning at Purchaser's site.</li> </ul>
		<ul style="list-style-type: none"> <li>· Complete training should be provided at the site for handling and software applications, analysis of datas as per the requirement of various applicable test methods.</li> </ul>
<b>18</b>	Technical support and service	Manufacturer should have established after sales & service network in India. The vendor shall have local service and application office and infrastructure to attend by visit within 48 hours of need.

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Eligibility Criteria

1. The tenderer shall have to meet the following eligibility criteria for being considered against this Invitation to tender:

A. The tenderer should be Original Equipment Manufacturer (OEM) of Universal Testing Machine (UTM) or their authorized representative. The tenderer, if OEM, shall submit ISO certificate/certificate from any Govt./Govt. authorized agency to show that the tenderer is a manufacturer of UTM.

B. In case of authorized representative, supporting documents like valid agreement between tenderer and OEM or valid certification of dealership from OEM or valid letter of authorization from OEM must also be submitted along with the ISO certificate/certificate from any Govt./Govt. authorized agency. OEM and Exclusive representative should have worked together for at least 5 years as on bid submission deadline.

2. The OEM should have an established / authorized service centre / service representative in India to provide technical support / after sales service of the equipment. Copy of valid agreement between OEM and authorized service centre /service representatives or authorization / certification by OEM shall be submitted.

3. The tenderer should have carried out Supply, Erection / Installation / Supervision of Erection or Installation / Commissioning / Supervision of Commissioning of at least three 3 Nos. of Universal Testing Machines of same as offered make and same capacity or higher (of same OEM in case of authorized representative) to any of the following in India prior to the date of release of Tender .

♦The tenderer should have supplied the said equipment to Govt. organization; PSU; Public Ltd. company or Joint venture company in which at least one partner is Govt. organization or PSU

The jobs should have been completed prior to the date of release of Tender. In case of merger or acquisition of the OEM after the first supply of such equipment from the date of release of Tender and the equipment make has changed subsequently, in that case supply with old make shall be considered for evaluation provided documents related to merger or acquisition is submitted along with the offer. OEM should specify the year of launch of the offered model and undertake spares availability of (i) minimum 10 years after the model is discontinued or (ii)15 years or above from the date of installation (whichever is higher).

Copies of the following documents shall be submitted in support of above and information to be furnished as given below:

a) Un-priced Purchase order / Work order / Award letter / contract document from client

b) Completion / installation & commissioning / performance certificate from client (should have reference to point 3(a) above) Complete address, contact person, company's e-mail address and telephone numbers of the above clients should also be furnished.

		4. All the technical specifications provided by the tenderer should be in context to the Model No. / part no. of the equipment mentioned in the official website of the OEM.
20	Machine Working Video Link	Machine Working Video Link must be provided.

5. Differential Scanning Calorimeter (DSC)		
Sl. No.	Specification	Range / Value
1	Purpose	· Measures heat absorbed or released by a sample as a function of time, temperature, and environment
		· Measurement of the following properties of polymers, rubbers, elastomers, etc.
		1. Glass transition temperature ( $T_g$ )
		2. Melting temperature ( $T_m$ )
		3. Crystallization temperature ( $T_c$ )
		4. % of crystallinity
		5. Heat of enthalpy
		6. Oxidative-Induction Time (OIT)

2	Principle/Definition	Heat Flux DSC or Modulated DSC
3	Reference Standard	ASTM D 3417-99, ASTM D 3418-15, ASTM E 1356-08(2014), ISO 11357-1:2016, ASTM-D 3895-14, IS-4984, ASTM E-1269
4	Temperature Range	Temperature Range: -70°C to 400°C or better
5	Temperature Accuracy	± 0.1 °C or better
6	Temperature Precision	± 0.05 °C or better
7	Data Points	10 per sec
8	Heating Rate	0.1 °C/min to 100°C/ min or higher
9	Cooling Rate	0.1 °C/min to 100°C/ min or higher
10	Cooling from 100 °C to RT	Below 5 minutes
11	Furnace	To be constructed of corrosion-resistant material suitable for rapid heating/cooling and should have a long lifetime.
12	Calorimeter Sensor	Thermopile or constantan or Ni/Cr Thermocouple
13	Maximum Calorimetric Sensitivity	0.2 μW or better
14	Calorimetric Precision (based on metal standard)	± 0.10% or better
15	Dynamic Range	± 170 mW or better



16	Software	Operating software and analysis software shall be user friendly and shall be running on windows 10 or higher version preferably ; <span style="float: right;">Compatible to Windows</span> and should have the capabilities to heating rate, temperature setting, etc. and capable of collecting data on heat flow, heat capacity enthalpy change, Cp, Tg, Tm, Tc, peak area, peak onset, etc
		Analysis software shall have the provision to smoothen to evaluate peak temperature, onset temperature, glass transition temperature, melting temperature, crystallization temperature, % of crystallinity, heat of enthalpy, heat of fusion, Oxidative-Induction Time (OIT), X-scaling w.r.t time, temperature, etc.
		The operating software should also be capable of periodically and automatically checking for updates via an Internet connection, and downloading/installing those updates if desired.
		Library ( Optional)
17	Measurement Atmosphere	N <sub>2</sub> or O <sub>2</sub> or air
18	Provision for cooling	Fully automatic Inbuilt electrical cooling system & accessories with variable cooling rates as specified above.
19	Control system	Built-in Gas mass flow control system with auto-gas switching option within the test run.
		DSC must include:
		01 no. of Graphite pan with lid
		100 nos. of Copper pans for the OIT test
		500 nos. of Aluminium pans with lid.
		Standard samples such as Indium, Tin with Traceable calibration Certificate for calibration purpose.
		Crimper and die set to be supplied along with the Instrument for sample preparation of both dry powder and liquid samples.

20	Accessories to be quoted and supplied along with machine / equipments:	<p>Suitable controlled cooling system for maintaining -70 to 400 °C range</p> <p>Gas Tubing &amp; fittings-01Set</p> <p>Moisture dryer-01Set</p> <p>PC of required configuration with the original software</p> <p>01 No. of filled N<sub>2</sub> gas cylinder with two-stage SS Gas regulator of the best quality with tubing fittings</p> <p>01 No. of filled O<sub>2</sub> gas cylinder with a two-stage SS Gas regulator of the best quality with tubing fittings.</p> <p>UPS (5 KVA) for 30 min or higher power backup</p> <p>Basic tool Kit-01 set</p> <p>Hard copies of Operational &amp; Service Manual- 01 set</p> <p>Necessary Hoses &amp; Nipples required -01 set</p>
21	Calibration Certificate	Calibration certificates for supplied reference material traceable to NIST and internal calibration report to be provided.
22	Personal Computer (PC)	A Personal Computer having latest configuration: i7 processor 10th generation, 16GB RAM, DVD - RW, 500 GBSSD, Windows 11 with lifetime licence, Latest microsoft Office professional, 27 ” LCD display, Wifi enabled( preferable specifications)along with a suitable laser color printer

		All software shall be loaded into the hard disk with appropriate partitions. All original CDs/DVDs must be provided.
23	Others	Catalogue and working video link of machine quoted explaining all features including subzero temp operation  Any issue on machinery, to be attended within 5 working days and shall have service centres in Manipur or any state in Eastern Region
24	Scope of supply	Complete list of items quoted are to be provided
25	Training	Training on operation & maintenance of the equipment should be provided onsite
26	Intallation & Commissioning	The Machine should come with all other essential accessories & spares (as per ASTM & ISO standards) required for installation, commissioning & operation.

#### 6. Impact Tester (Pendulum) (IzodCharpy)

Sl. No.	Specification	Range / Value
	The machine should offer following key features	
1	Machine Design	Microprocessor based instrument to automatically calculate and display impact energy absorbed by a specimen. It should resolve energies less than 0.03% of the capacity of the pendulum.  With the proper selection of accessories, machine should perform Izod & charpy tests in accordance with ASTM D256 & ISO 180 (Izod Impact) ASTM D6110 & ISO 179, IS 15801 (Charpy Impact) Easy switching between tests by choosing appropriate striking bit
2	Pendulum	Basic Pendulum with facility to increase/decrease pendulum capacity with addition/removal of weights / hammers enabling user to change to desired capacity quickly & easily
		Should offer simple machine configuration and setting test parameters through display

3	Display	Selectable energy units of J, in.lbf, ft.lbf, kgf.m, kgf.cm
		Selectable strength calculations in ft.lbf/in, J/m, kgf.m/m, KJ/m <sup>2</sup> , in.lbf/in, kgf.m/m <sup>2</sup>
		Should offer break type input options
		Should provide real time display of energy
		Simple calibration routine which should automatically calculate the Windage and Friction losses
		Facility to set Upper and Lower Limits for Energy and Strength
		Toss Correction for low energy specimens should be implemented automatically or by keypad entry
4	Technical Specifications	Basic pendulum capacity: 2 to 3 J , with addition of weights or hammers , user should be able to change it to 15 J (Standard).
		Drop Height: 0.61m
		Impact velocity: 3.46m/s
		Power: 220V/50Hz, single phase
5	Charpy setup	Should include charpy striker, anvils, setting gauges & supports as per ASTM D6110 & ISO 179, IS 15801
6	Izod setup	Should include Izod striker, setting gauges & supports as per ASTM D256 & ISO 180
		Notch Aligning tool for specimen Positioning
7	Add-on Weights / Hammers	Various weight sets upto 15J capacity (ISO & ASTM methods)
8	Certification	Calibration/verification certificate issued by NABL accredited Laboratory / traceable to NIST

9	Other Mandatory Accessories to be quoted and supplied along with machine / equipment	<p>Automatic specimen notch cutting machine to produce notch on test specimen in accordance with ISO 179, ISO 180, ASTM D256 &amp; ASTM D6110, IS 15801 with angle measurement template with calibration traceable to NABL</p> <p>Proper safety features shall be provided.</p> <p>Dust suction system (for automatic removal of particles generated during notch preparation) and Cooling system to prevent degradation of specimen shall be provided</p>
10	Scope of Supply :	<p>Equipment with mentioned specification and calibration certificates</p> <p>Basic Equipment, Pendulum, Additional weights or hammers, Izod and Charpy setup, Specimen notch cutter and other additional items required to carry out Izod and Charpy impact test as per the standard requirements.</p> <p>NIST traceable/NABL accredited calibration certificates to be supplied</p>